WHAT IS CLAIMED IS:

1. A method of reducing back injury comprising:

placing a support belt about the lower trunk of a human user;

tightening said support belt so as to apply pressure of at least a first level to predetermined points along the sides of the lower trunk, said support belt as a whole applying an average pressure of at least a second level around the lower trunk of the human user, the pressure of the first level exceeding the average pressure of the second level;

said pressure of the first level reducing the tendency of the muscles of the back of the human user to overcompensate to sudden or unexpected loading events.

2. The method as set forth in claim 1 wherein the support belt includes protrusions that in use are disposed along the sides of the lower trunk of the human user to apply said pressure of the first level.

3. The method as set forth in claim 2 wherein the protrusions have a uniform cross-sectional shape.

4. The method as set forth in claim 2 wherein the protrusions are disposed on a portion of the support belt having a firmness that is higher than the average firmness of the support belt.

5. The method as set forth in claim 2 wherein the support belt is substantially free from protrusions except for those disposed along the sides of the lower trunk of the human user during use.

6. The method as set forth in claim 1 wherein the support belt includes first and second sets of protrusions disposed along opposing sides of the support belt in such positions as to be disposed along the sides of the lower trunk of the human user during use.

7. The method as set forth in claim 6 wherein the support belt further includes additional protrusions disposed intermediate the first and second sets of protrusions.

8. The method as set forth in claim 1 wherein the support belt includes a first set of protrusions generally at a 90 degree position on the support belt and a second set of protrusions generally at a 270 degree position on the support belt.

9. A support belt for reducing back injury comprising:

a support belt body sized to fit about the lower trunk of a human user, said support belt body having a front designed to be worn along the front of the lower trunk of the human user, a back designed to be worn along the back of the lower trunk of the human user, and sides designed to be worn along the sides of the human user;

first and second sets of protrusions disposed along the sides of the support belt body so as to press against the sides of the lower trunk of the human user during use;

said protrusions of each set being of a size to apply pressure at recognizably separate points along each side of the lower trunk of the human user, whereby the pressure applied by the protrusions reduces any tendency of the muscles of the back of the human user to overcompensate to sudden or unexpected loading events.

10. The support belt as set forth in claim 9 wherein the protrusions are disposed on the anterior surface of the belt.

11. The support belt as set forth in claim 9 wherein the protrusions in a set are disposed between approximately four millimeters and approximately seventy millimeters, measured center to center, from each other.

12. The support belt as set forth in claim 11 further including additional protrusions disposed along the support belt body between the first and second sets of protrusions, said

additional protrusions applying less pressure to the lower trunk of the human user than at least some of the protrusions of the first and second sets of protrusions.

13. The support belt as set forth in claim 11 wherein the protrusions have a height of from approximately one-eighth inch (3.175 millimeters) to approximately one inch (25.4 mm)

14. The support belt as set forth in claim 13 wherein the protrusions have a hemispherical shape.

15. A method of reducing fatigue of a human comprising:

instructing a human user to place a support belt about the lower trunk of a human user, in a position substantially lower than an average position for placement of support belts;

placing the support belt in said substantially lower position;

tightening the support belt in said substantially lower position and retaining said support belt in said substantially lower position during the time the support belt is worn by the human user.

16. The method as set forth in claim 15 wherein in the substantially lower position the top, front edge of the support belt is approximately one to approximately two inches below the navel of the human user, said belt in the substantially lower position providing only insignificant support at or above the navel of the human user.

17. The method as set forth in claim 15 further including continuously applying pressure at points along the sides of the lower trunk of the human user in an amount greater than the average pressure applied by the support belt.

18. A method of improving lifting and lowering technique for a human comprising:

instructing a human user to place a support belt about the lower trunk of the human user, in a position substantially lower than the average position for placement of support belts;

placing the support belt in said substantially lower position;

tightening the support belt in said substantially lower position and retaining said support belt in said substantially lower position during the time the support belt is worn by the human user.

19. The method as set forth in claim 18 wherein in the substantially lower position the top, front edge of the support belt is approximately one to approximately two inches below the navel of the human user, said belt in the substantially lower position providing only insignificant support at or above the navel of the human user.

20. The method as set forth in claim 18 further including continuously applying pressure at points along the sides of the lower trunk of the human user in an amount greater than the average pressure applied by the support belt.

21. A method of testing ergonomic support belts to evaluate the change in the estimated forces, moments, or stresses applied to an intervertebral disc upon applying a predetermined external load to a human subject comprising:

(a) fitting a plurality of human subjects with an ergonomic support belt;

(b) applying a predetermined load to the series of human subjects;

(c) measuring muscle response to the application of the predetermined external load of each human subject;

(d) estimating the forces, moments, or stresses applied to at least one intervertebral disc of the human subject;

(e) modifying the ergonomic support belt;

(f) repeating steps (c), (d) and (e); and

(g) selecting a modified ergonomic support belt of step (e) exhibiting minimized forces,

moments, or stresses applied to at least one intervertebral disc measured by step (d).

22. The method of claim 21, wherein step (e) of modifying the ergonomic support belt comprises using a computer under software control to model the forces, moments, or stresses applied by the ergonomic support belt to the human subject.

23. The method of claim 22, wherein the forces, moments, or stresses are applied to a preselected portion of the body of the human subject.

24. A method of testing ergonomic support belts to evaluate the change in the estimated forces, moments, or stresses applied to an intervertebral disc upon applying a predetermined external load to a human subject comprising:

(a) fitting a plurality of human subjects with an ergonomic support belt;

(b) applying a predetermined load to the series of human subjects;

(c) measuring muscle response to the application of the predetermined external load of each human subject;

(d) estimating the forces, moments, or stresses applied to at least one intervertebral disc of the human subject;

(e) modifying the ergonomic support belt;

(f) repeating steps (c) and (d); and

(g) selecting a modified ergonomic support belt of step (e) exhibiting minimized forces, moments, or stresses applied to at least one intervertebral disc measured by step (d).

25. The method of claim 24, wherein step (e) of modifying the ergonomic support belt comprises using a computer under software control to model the forces, moments, or stresses applied by the ergonomic support belt to the human subject.

26. The method of claim 25, wherein the forces, moments, or stresses are applied to a

preselected portion of the body of the human subject.

27. A method of reducing back injury in a human subject comprising:

securing an ergonomic back support to the human such that a first force applying structure is disposed adjacent a first preselected location of the body of the human, and a second force applying structure is disposed adjacent a second preselected location of the body of the human, said first and second force applying structures in use applying substantially similar forces to the human body, said back support intermediate said first and second force applying structures applying forces to the human body that substantially differ from the forces applied by the first and second structures.

28. The method of claim 27 wherein the forces are preselected to minimize the forces, moments, or stresses applied to at least one intervertebral disc of the human subject.

29. The method of claim 27 wherein the forces applied by the first and second structures are substantially higher than the forces applied by the back support intermediate said first and second structures.

30. A system for modeling the response of a human subject to suddenly applied loads comprising:

(a) at least one sensor for measuring (the time and/or magnitude of) the sudden load applied to the human subject;

(b) at least one sensor for measuring muscle response in the trunk of the human subject to the suddenly applied load;

(c) at least one sensor for measuring forces, moments, or stresses at the feet of the human subject resulting from the application of the suddenly applied load; and

(d) a computer under software control for receiving input from the sensors and for modeling

the forces, moments, or stresses applied to at least one intervertebral disc of the human subject as a result of the suddenly applied load being applied to the human subject.

31. The system as set forth in claim 30 further including at least one sensor for measuring motion of at least one body segment resulting from the application of the suddenly applied load, and at least one sensor for measuring the time course of the magnitude of the suddenly applied load.

32. A system for analyzing the response of human bodies to loading events such as unexpected or sudden loading events, said system comprising:

a link-dynamics model and a finite element model of the human body stored in a computer readable form, said model including models of bones, and further including models of soft tissues, including muscles and organs;

an apparatus for applying loading events to the bodies of human subjects, said loading events being selected from the group consisting of sudden, expected loading events and unexpected loading events;

sensors for detecting the response of each human body in at least one location of said body to the loading events;

a computer for receiving data from said sensors, said computer using the models and the data from the sensors to determine the response of human subjects in at least a second location of the human body to said loading events.

33. The system as set forth in claim 32 wherein the computer determines the response of various muscle groups to the loading events, at least some of said muscle groups not having their response measured by the sensors.

34. The system as set forth in claim 32 wherein the computer uses the models and results from a plurality of human subjects to predict human body responses to said loading events.

35. The system as set forth in claim 34 wherein the computer uses said models and said results to predict differences in human body responses as a function of at least one of body shape, body size, age, conditioning, and sex.

36. The system as set forth in claim 32 wherein the computer uses the models and results from a plurality of human subjects to predict long-term cumulative injuries.

37. The system as set forth in claim 32 wherein the models and the results from a plurality of human subjects are used to predict potential back injury.

38. The system as set forth in claim 32 wherein the models and the results from a plurality of human subjects are used to predict potential joint injury and injury of its associated active and passive soft tissues.

39. The system as set forth in claim 32 wherein the models and the results from a plurality of human subjects are used to provide design information for support apparel such as back supports and joint braces.

40. An item of support apparel for reducing the risk of injury to a human user comprising:

a support body for substantially encircling at least a part of a human body;

at least one side panel disposed at a predetermined position along the support body;

a plurality of protrusions at the side panel to apply selectively increased pressure to the human body at a position determined by the location of the side panel.

41. The item of support apparel as set forth in claim 40 wherein the location of said side panel is a function of at least one of body shape, body size, age, conditioning, and sex.

42. The item of support apparel as set forth in claim 40 wherein the item is a back support, and wherein no protrusions are disposed on the back of the human body when the back support is worn as intended.

43. The item of support apparel as set forth in claim 40 wherein the item is a back support, further including two side panels spaced along the support body to be disposed along the sides of a human user, each side panel having a plurality of said protrusions.

44. The item of support apparel as set forth in claim 43 wherein said protrusions on each panel are spaced between approximately 4 millimeters and 70 millimeters, measured center to center, from each other.

45. The item of support apparel as set forth in claim 44 wherein said protrusions have a height from approximately one quarter inch (6.35 mm) to approximately one inch (25.4 mm).

46. The item of support apparel as set forth in claim 44 wherein the protrusions have a uniform cross-sectional shape.

47. The item of support apparel as set forth in claim 46 wherein the protrusions have a hemispherical shape .

48. The item of support apparel as set forth in claim 40 wherein the item of support apparel is a joint brace.

49. The item of support apparel as set forth in claim 40 wherein the support body and the side panel are composed of elastic material.

50. The item of support apparel as set forth in claim 49 wherein the elastic material has a warp axis and a weft axis transverse thereto, the elastic material being cut so that the weft axis substantially encircles the human body.

51. The item of support apparel as set forth in claim 40 wherein the item of support apparel is a support belt, further including placement structure for facilitating the placement of the support body at least one inch below the navel of a human user wearing the support apparel.

52. The item of support apparel as set forth in claim 51 wherein the placement structure is one selected from interior belt loops connected to the support body, adjustable shoulder straps with a release connected to the support body, and a back adjustment mechanism connected to the support body.

53. The item of support apparel as set forth in claim 40 wherein the support body at the side panel provides a foundation for the protrusions having a firmness higher than the average firmness of the support body.